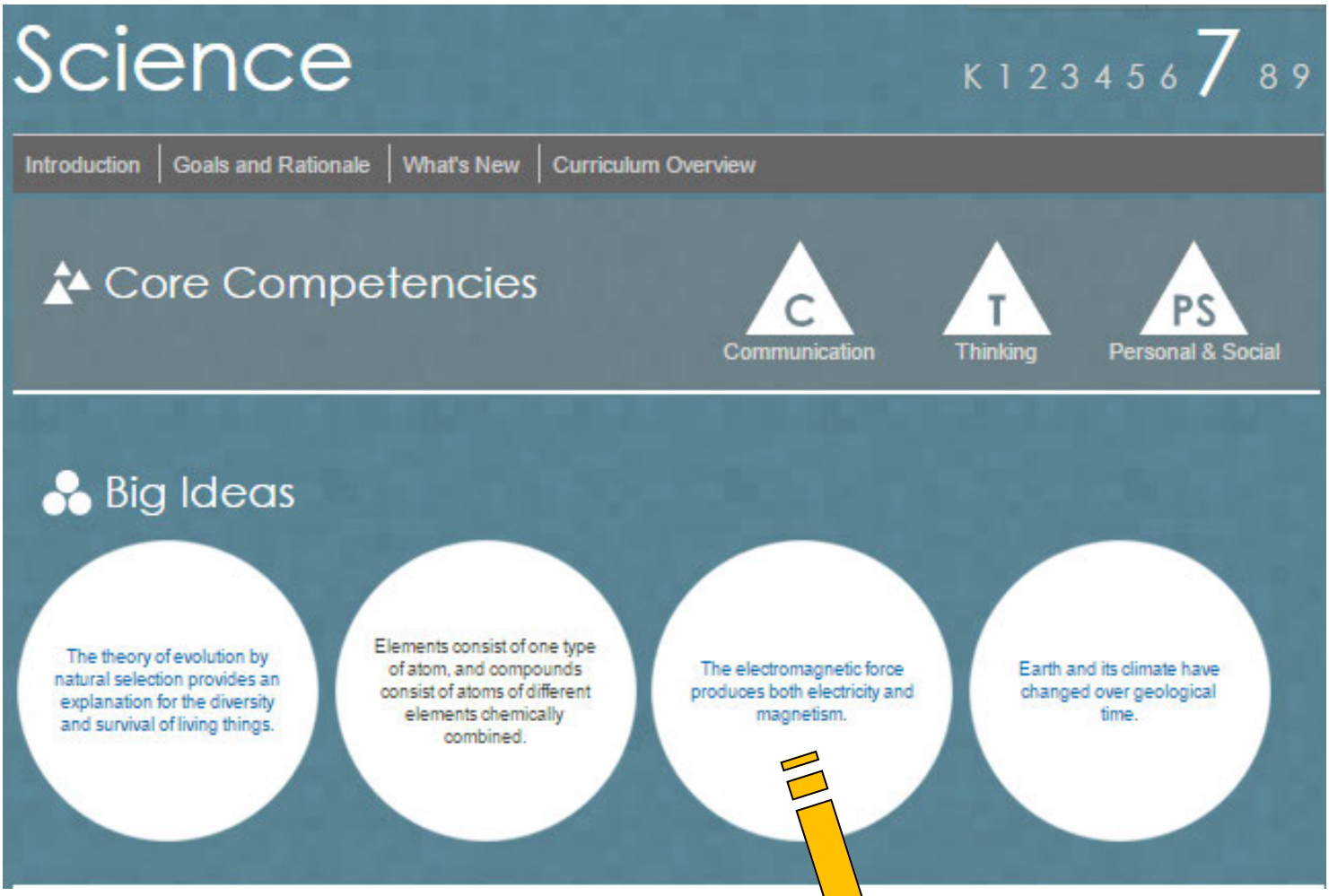
Physics

Grade 7



Science 7

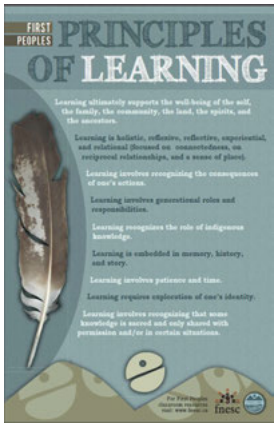
The electromagnet force, along with other forces such as gravity and friction, is one of the foundational forces governing the universe. In today's world, the use of electricity is an integral part of our daily lives (light, heat, computers, TV, and other devices).

Grade 7 students will be moving on to high school in grade 8. Understanding electricity and magnetism allows students to explore electives (and possible careers) based on these fundamental forces.

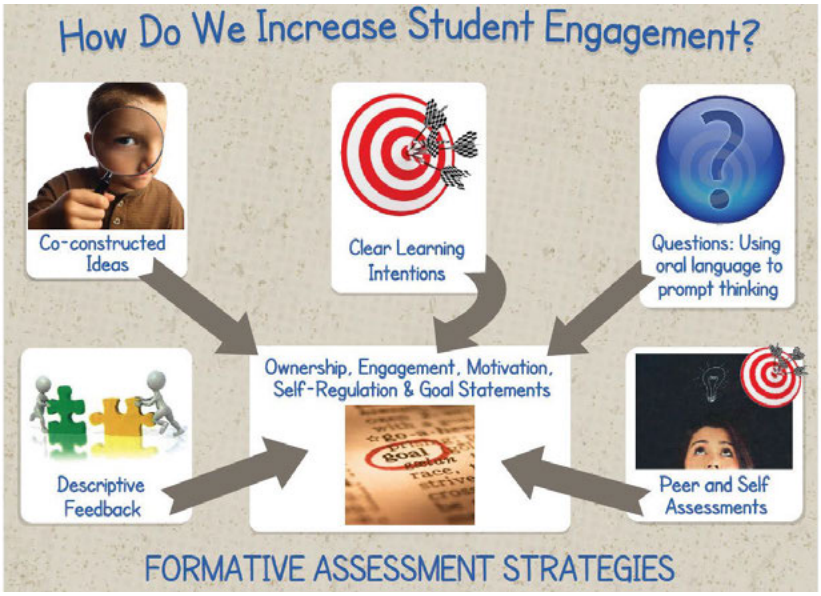
This science topic, more than any other, serves as a clear pathway to careers in the trades.

An electronic copy of this teacher guide can be found on Learn71:

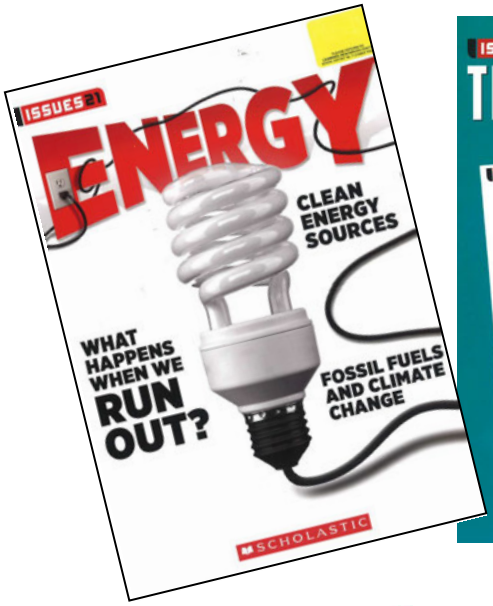
https://portal.sd71.bc.ca/group/wyhzgr4/Pages/default.aspx

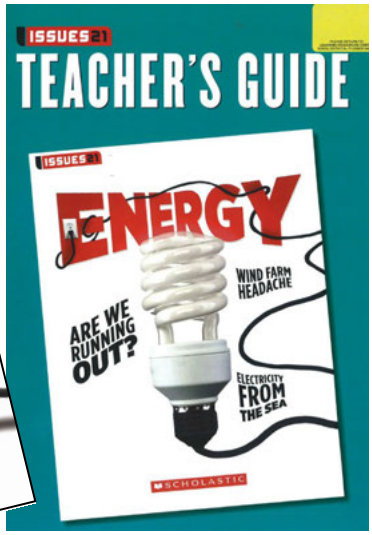


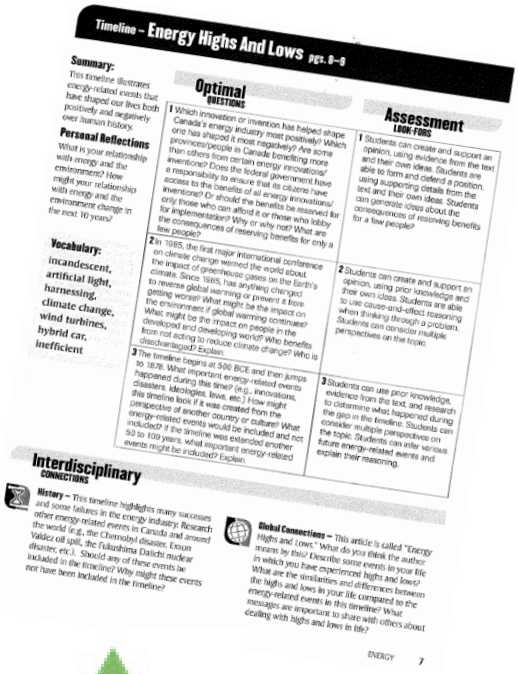
Suggested Ways to Weave Aboriginal Ways of Knowing within this unit:
Learning is experiential and place-based: Go to Comox Lake and walk down the pipes to our local power station. On another day tour the power station then travel from there along the Puntledge River. This allows students to better understand the need for slope, conserving our waterways, that Comox Lake is behind a human-made dam and is subject to tectonic forces (earthquakes).
Recognizing the consequences of one's actions: By examining our role in global warming, and our negative influences on our environment, we offer an exploration or inquiry into the cause and affect of our lifestyle and actions.
Learning Involves patience and time: Concepts within this unit may seem difficult to understand to some/many of our learners. With patience and practice with practical experiences, over time these concepts will make sense.
Learning is Embedded in Memory, History, and Story: By examining the history and stories of early scientists who discovered the physics concepts covered within this unit, a greater understanding of concepts emerges.

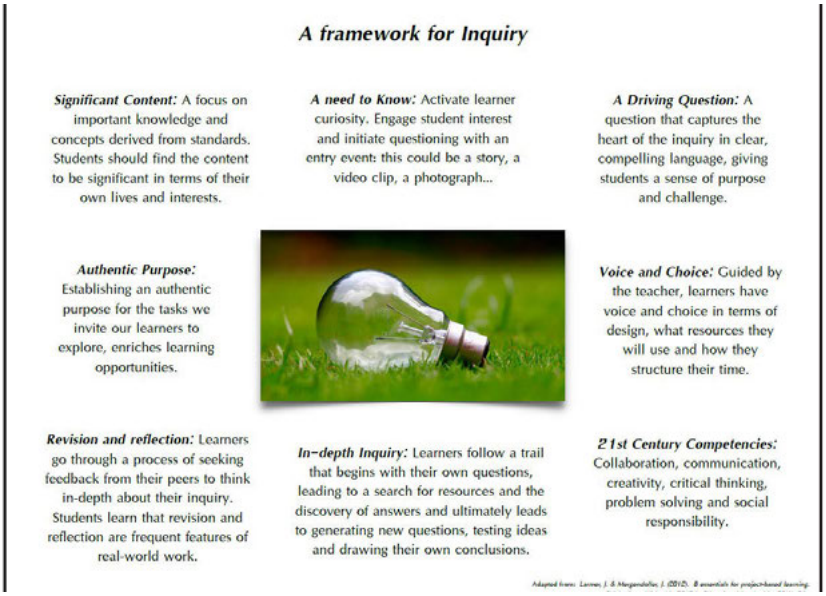


Suggested Ways to Embed Assessment ***for*** Learning Strategies:
When we ask lots of questions, our students get curious and THEY do the work. The simple act of asking questions has the massive potential of turning passive learners into actively engaged students. So ask lots of content-related questions! Please consider adding the 'Energy' unit from **Scholastic's Issues 21** to this science unit. The teacher's guide is FILLED with well-worded questions to provoke thinking.









Suggested Ways to Engage Students in Science Inquiry:	
A Need to Know	You use electricity in every part of your life. You heart is both an electrical device and a pump. Most of your food is preserved or cooked using electricity (in a fridge/stove/microwave, toaster). Rooms are lit with electricity. Computers, phones, and headphones use this source of power. How are the different forms of electricity created or generated, transmitted, and used?
A Driving Question	How is electricity generated? What is the relationship between electricity and magnetism? What happens if the electricity goes off in our community and stays off for two days, one week, or longer? How might our response to this situation differ from other countries around the world? What creatures use magnetic fields to navigate? What creatures create their own electric power? (explore electric eels and bioluminescence) What would happen if the Earth's magnetic field changed? What kinds of careers use an understanding of electromagnetic forces?
An authentic Purpose	Unfortunately many teachers are experiencing higher numbers of passive students. When we create authentic purposes for their work, we stand a better chance of increasing their levels of engagement. Please consider: • Simple scientific experiments to engage learners, (generate electricity ~ static electricity e.g. a lemon to generate electricity or fun with static electricity; simple hands-on magnetism activities; electromagnet activities) • hands on experiences using the Snap Circuit kit and the *Electricity and Magnetism Experiments* book. • local field trips to reinforce the scientific skills within this unit.
Significant Content	We loop back to our driving question and our need to know. The content becomes significant when it matters to our students. How can we make this material relevant?

Big Ideas

The electromagnetic force produces both electricity and magnetism.

Content

- electricity - generated in different ways with different environmental impacts
- electricity - used to generate magnetism

Suggested Instructional Topics and a Potential Sequence:

1. What is magnetism? What materials are magnetic? What is lodestone? When were Magnetic fields and Magnetic forces discovered? Who discovered them? How are they used?

2. What is electricity? (static, direct current, alternating current, understand generation through a local field trip to Comox Lake, and a second field trip to the power station)

3. Field trips provide the understanding of how we use water to store its potential power and use that potential to generate electricity

4. What is electromagnetism?

5. How do we use electromagnets? (uses in daily life; develop an understanding by building snap circuits; also use a variety of e-resources)

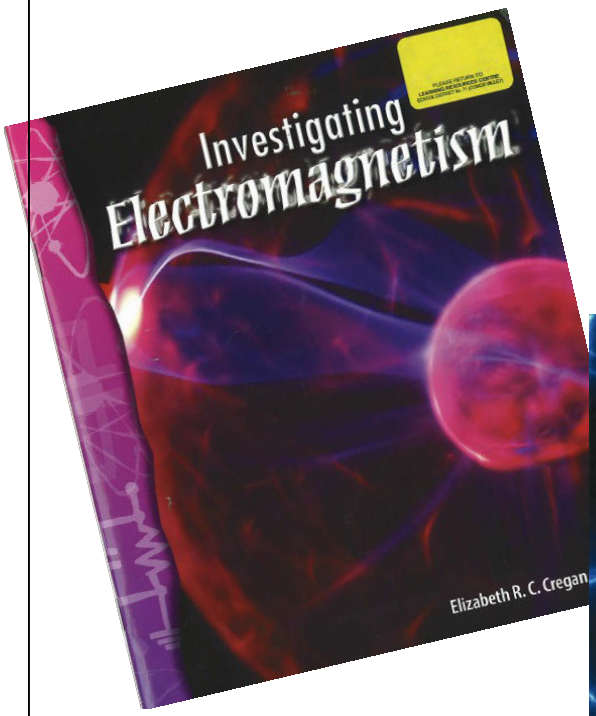
6. What would it be like to live without these forces? (in an emergency, and as a result of the shifting of the Earth's magnetic field)

7. Taking the next steps through inquiry projects (near-term futures: electric cars (Elon Musk), storage batteries (Elon Musk), magnetic levitation trains, driverless vehicles,

8. Canadian role models in this area of study

Notice, Think, and Wonder

Please make time for the books within this science unit to be shared among students in an informal way. **During silent reading time**, books from this kit and from those gathered at your school library may be shared in a casual buddy reading/info circles format. As students share these books, who knows what might occur … students may naturally launch into requests of, "Can we try this?" Inquiry is born from subtle suggestions toward an intended destination!



"Maybe … perhaps … or I think … " Exploratory talk like this brings multiple minds together to work on the same problem in powerful ways.

Peter Johnson author of Choice Words

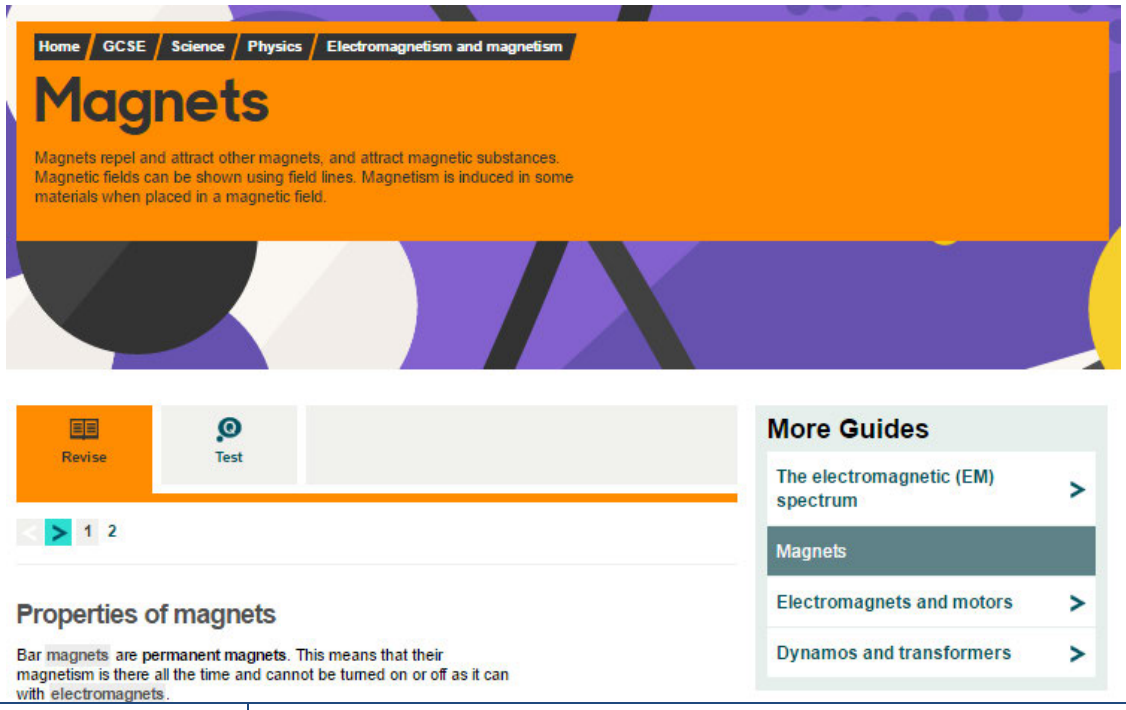
Acknowledge and affirm the question and the curiosity. Use the 'language of possibility' … 'maybe', 'could be', 'what if'… Experiment, explore, discover, wonder, persist, re-think, model, wonder aloud … then walk away and see what happens!

Kath Murdoch author of Collaborative Inquiry

1. What is Magnetism?

We want students to understand the following:

http://www.bbc.co.uk/education/guides/zxxbkqt/revision

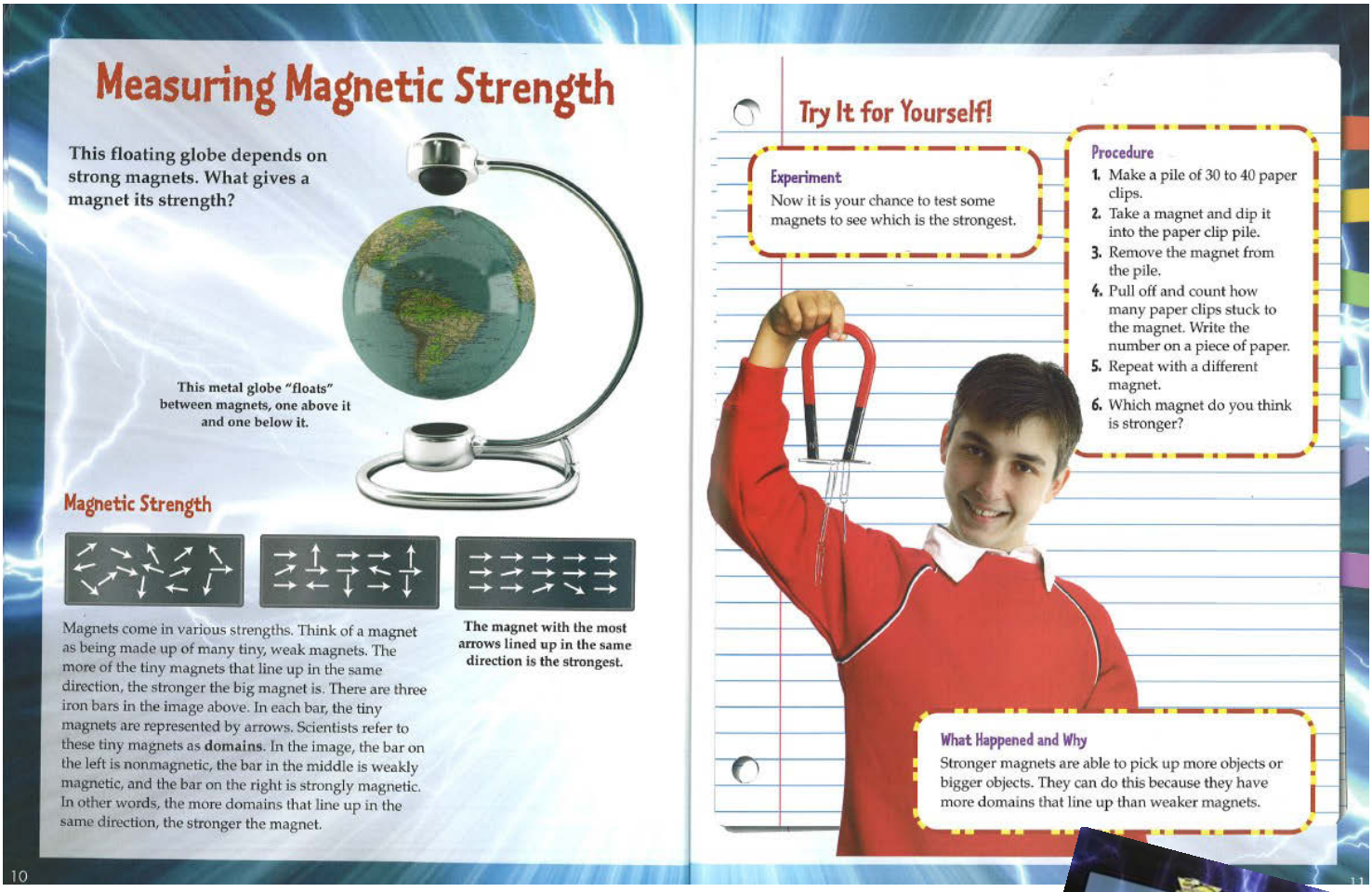


History of Magnetism	https://www.youtube.com/watch?v=u6v4J-CpKQE&list=PLVjy6qrJZvH6zKFYWwkIA74gNcfCVFtQL&index=11
The Science Behind Magnets: How do they Work? - Stuff to Blow Your Kids' Mind #2	https://www.youtube.com/watch?v=MZtTVsIOA9c
Bill Nye - Magnetism (edited)	https://www.youtube.com/watch?v=079ROtsEf2k
MAGNETS: How Do They Work?	https://www.youtube.com/watch?v=hFAOXdXZ5TM
How Magnet Works - The FORCE of Nature | A Documentary Film (45 mins)	https://www.youtube.com/watch?v=BY1LS10GMkg
Monster Magnets	https://www.youtube.com/watch?v=MfNt44pFo9o

1. What is Magnetism?

Why are some magnets stronger than others?

When provided with a variety of magnets, students can determine which magnets are stronger than others. But why is this? After doing this simple experiment, challenge students to a mini inquiry around this question. Research will lead them towards information about domains ~ the more domains that line up in the same direction, the stronger the magnet.



Measuring Magnetic Strength

This floating globe depends on strong magnets. What gives a magnet its strength?

This metal globe "floats" between magnets, one above it and one below it.

Magnetic Strength

The magnet with the most arrows lined up in the same direction is the strongest.

Magnets come in various strengths. Think of a magnet as being made up of many tiny, weak magnets. The more of the tiny magnets that line up in the same direction, the stronger the big magnet is. There are three iron bars in the image above. In each bar, the tiny magnets are represented by arrows. Scientists refer to these tiny magnets as **domains**. In the image, the bar on the left is nonmagnetic, the bar in the middle is weakly magnetic, and the bar on the right is strongly magnetic. In other words, the more domains that line up in the same direction, the stronger the magnet.

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Try It for Yourself!

Experiment

Now it is your chance to test some magnets to see which is the strongest.

Procedure

1. Make a pile of 30 to 40 paper clips.
2. Take a magnet and dip it into the paper clip pile.
3. Remove the magnet from the pile.
4. Pull off and count how many paper clips stuck to the magnet. Write the number on a piece of paper.
5. Repeat with a different magnet.
6. Which magnet do you think is stronger?

What Happened and Why

Stronger magnets are able to pick up more objects or bigger objects. They can do this because they have more domains that line up than weaker magnets.

11

Source: Understanding Electricity: What is Electromagnetism?

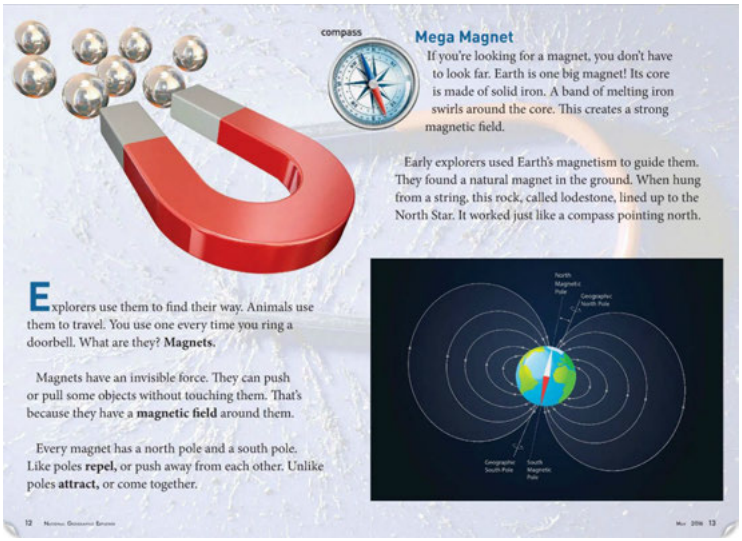
by Lionel Sandner

Do a Google search ...
National Geographic Explorer and look for the May 2016 Edition

Please check out **National Geographic Explorer** for on-line articles that may be projected in your classroom. In addition … you can get the same article in ***FOUR DIFFERENT READING LEVELS!*** The May 2016 edition has an article on magnets.

Pioneer Edition | Trailblazer Edition | Pathfinder Edition | Adventurer Edition

Pioneer Edition:



compass

Mega Magnet

If you're looking for a magnet, you don't have to look far. Earth is one big magnet! Its core is made of solid iron. A band of melting iron swirls around the core. This creates a strong magnetic field.

Early explorers used Earth's magnetism to guide them. They found a natural magnet in the ground. When hung from a string, this rock, called lodestone, lined up to the North Star. It worked just like a compass pointing north.

Explorers use them to find their way. Animals use them to travel. You use one every time you ring a doorbell. What are they? **Magnets.**

Magnets have an invisible force. They can push or pull some objects without touching them. That's because they have a **magnetic field** around them.

Every magnet has a north pole and a south pole. Like poles **repel,** or push away from each other. Unlike poles **attract,** or come together.

North Magnetic Pole
Geographic North Pole
Geographic South Pole
South Magnetic Pole

12 National Geographic Explorer May 2016 13

Trailblazer Edition:

Explorers use them to navigate. High-speed trains use them to zip down the tracks. What are they? **Magnets.** Magnets use an invisible force. They can push or pull some objects without touching them.

A magnet's force is strongest at its poles. All magnets have **magnetic poles.** They have a north pole and a south pole. The opposite poles of two magnets will **attract.** But the same poles will **repel.**

Mega Magnet

Earth itself is one big magnet. Its core is solid iron surrounded by a churning band of melted iron. The churning iron creates a huge **magnetic field** with two poles. Earth's magnetic field is so strong it goes into space.

Early explorers made use of a natural magnetic rock called lodestone. It's made from magnetite. When the magnetite is hit by lightning, the atoms in the lodestone line up in the direction of the North Star. Explorers used it as a compass.

Animal Magnetism

Animals use Earth's magnetic poles to help them on long, yearly trips. These trips are called migrations.

Baby loggerhead sea turtles find their way along their migration route the first time they swim it. How? Tiny bits of iron in their brains help them sense the Earth's magnetic fields. This guides them in the right direction.

Loggerhead sea turtles rely on magnetism to navigate.

The *Aurora Australis*, as seen from space.

Magnetism at Earth's poles interact with particles from the sun, creating beautiful light displays called auroras.

12 National Geographic Explorer May 2016 13

Pathfinder Edition:

Explorers use them to navigate. Animals use them to migrate. High-speed trains use them to zip down tracks. You use one when you click the remote control for your TV. What are they? **Magnets.** Magnets use an invisible force. They can push or pull some objects without even touching them. That's because the spinning motion of electrons inside a magnet create a **magnetic field.**

All magnets have two **magnetic poles**—north and south. A magnet's force is strongest at these poles. The north and south poles of two magnets **attract.** But two of the same poles will **repel.**

Mega Magnet

If you're looking for a magnet, you don't have to go far. Earth itself is one big magnet. Its core is solid iron surrounded by a churning band of melted iron. The churning iron creates a huge magnetic field with two poles. Earth's magnetic field is so strong it extends out into space. If you are standing in the right place at the right time, you can see this field with your own eyes! Particles from the sun move through the field and produce unusual lights at Earth's poles. *Aurora Borealis* is at the North Pole. *Aurora Australis* is at the South Pole.

Early explorers made use of a natural magnet called lodestone. It's made from magnetite. When magnetite is electrified by lightning, the atoms in the lodestone align. Since the lodestone lined up in the direction of the North Star, it was used as a compass.

Animal Magnetism

Animals rely on Earth's magnetism, too. They use it to help them on long, yearly trips called migrations. Baby loggerhead sea turtles find their way along a 12,800-kilometer migration route the first time they swim it. How do they do it? Tiny bits of iron oxide in their brains help these turtles sense the Earth's magnetic fields.

The turtles aren't alone. A magnetic sense also guides honeybees, homing pigeons, trout, whales, and other animals.

Loggerhead sea turtles rely on magnetism to navigate.

The *Aurora Australis*, as seen from space.

Magnetism at Earth's poles interact with particles from the sun, creating spectacular light displays.

12 National Geographic Explorer May 2016 13

Adventurer Edition:

Explorers use them to navigate. Animals use them to migrate. High-speed trains use them to zip down the tracks. You use one every time you click the remote control on your TV. What are they? **Magnets.**

Magnets exert an invisible force. They can push or pull certain objects without even touching them. That's because they are surrounded by a **magnetic field.** Scientists think this field comes from the spinning motion of electrons in a magnet's atoms.

All magnets have two **magnetic poles,** or ends: a north-seeking pole and a south-seeking pole. A magnet's force is strongest at its poles.

You've heard the phrase "opposites attract"? That's true of magnets. The north and south poles of two magnets will **attract.** But two poles of the same direction will **repel** each other.

Mega Magnet

If you're looking for a magnet, you don't have to go far. Earth itself is one big magnet. Its core is solid iron surrounded by a churning band of melted iron. The churning iron creates a huge magnetic field with two poles.

Earth's magnetic field is so strong it extends out into space. If you are standing in the right place at the right time, you can see this field with your own eyes!

Particles from the sun move through the field and produce unusual lights at Earth's poles, like the *Aurora Borealis* at the North Pole or the *Aurora Australis* at the South Pole.

Early explorers made use of a natural magnet called lodestone they found on the ground. It's made from magnetite. When magnetite is struck by lightning, the atoms in the lodestone align and create a magnet. Explorers suspended a piece of lodestone so it could turn. The lodestone always lined up in the direction of the North Star, so they used it as a compass.

Animal Magnetism

Explorers weren't the only ones to use Earth's magnetism. Animals rely on it, too. Many species use magnetism to help them on long, yearly trips called migrations.

Baby loggerhead sea turtles are able to find their way along a 12,800-kilometer migration route the first time they ever swim it. How is this possible? Tiny bits of iron oxide in their brains help these thumb-size turtles sense the Earth's magnetic fields.

Loggerhead turtles aren't alone. Scientists believe a magnetic sense guides many animals ranging from honeybees and homing pigeons to trout and whales.

Loggerhead sea turtles rely on magnetism to navigate.

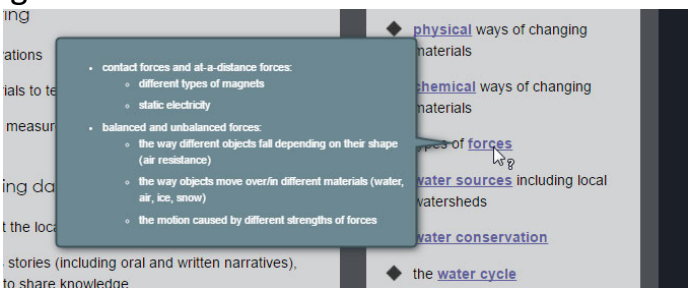
The *Aurora Australis*, as seen from space.

Magnetism at Earth's poles interact with particles from the sun, creating spectacular light displays.

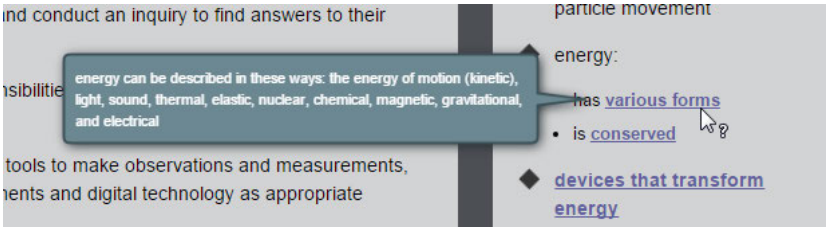
12 National Geographic Explorer May 2016 13

The concept of magnetism is revisited several times in B.C.'s curriculum. ***The Layers of Learning*** site may be useful in providing some of the earlier skills in review.

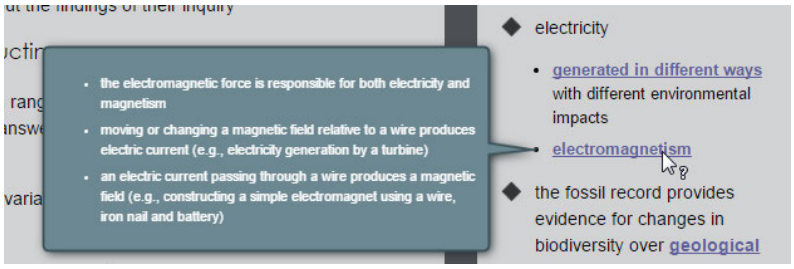
grade 2 science in B.C.'s curriculum



grade 4 science in B.C.'s curriculum



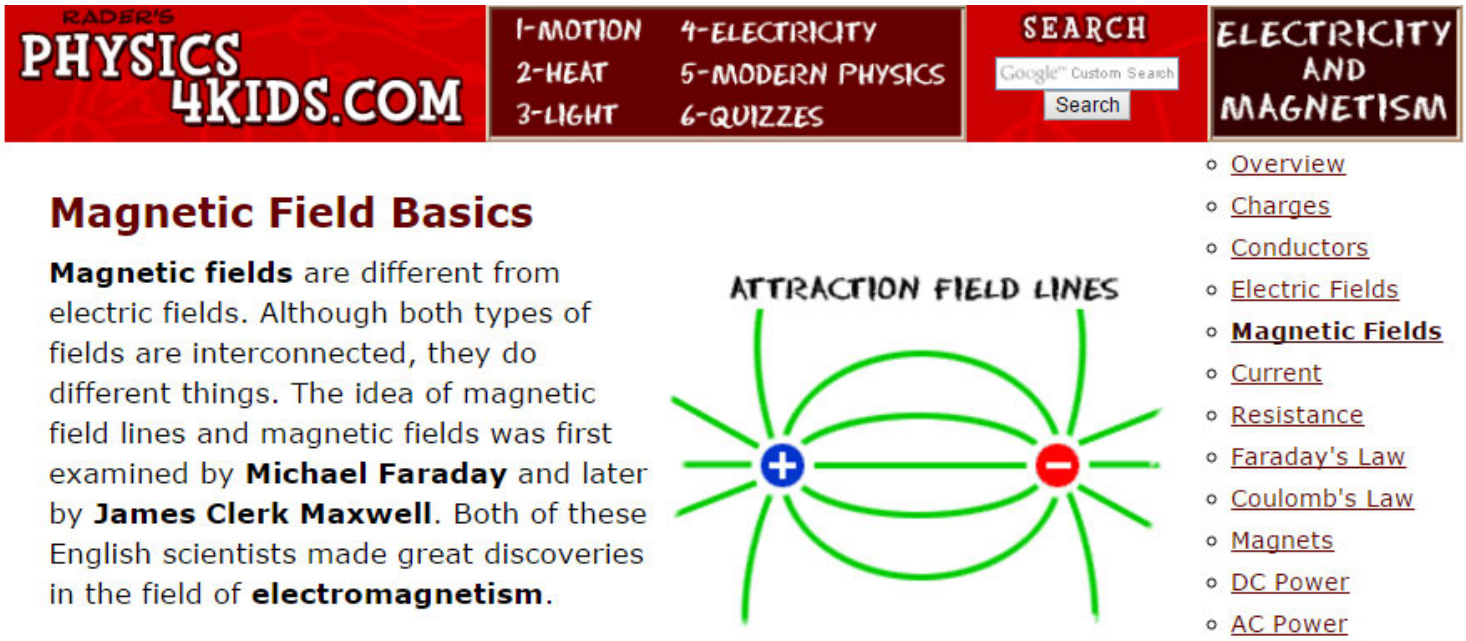
grade 7 science in B.C.'s curriculum



http://www.layers-of-learning.com/magnetism/

1. The discovery of Magnetic fields and Magnetic forces

We want students to understand the following:



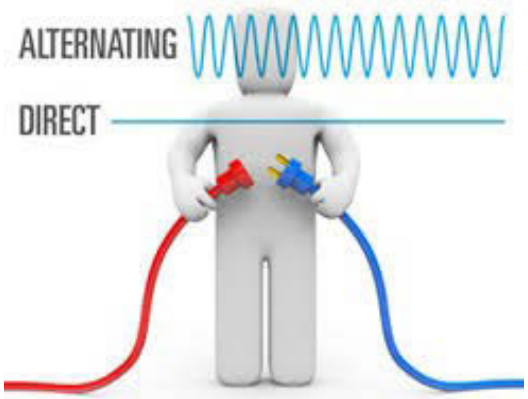
Magnetic Field Basics	http://www.physics4kids.com/files/elec_magneticfield.html
Properties of Magnets	http://www.bbc.co.uk/education/guides/zxxbkqt/revision
	http://hrsbstaff.ednet.ns.ca/pboudrea/class_notes/Physics12/electromagnetism/General%20Properties%20of%20Magnets.pdf
Oersted's Compass	https://nationalmaglab.org/education/magnet-academy/watch-play/interactive/orsted-s-compass
Magnetic Field History	http://www-spof.gsfc.nasa.gov/Education/whmfield.html
100 Greatest Discoveries	http://science.howstuffworks.com/environmental/29143-100-greatest-discoveries-earths-magnetic-field-video.htm
Magnetic North Pole	http://science.howstuffworks.com/environmental/earth/geophysics/question782.htm
How the Northern Light Work	http://www.space.com/15213-northern-lights-aurora-guide-infographic.html
Geomagnetism	http://geomag.nrcan.gc.ca/index-en.php

2. What is static electricity?

Start with static, move to direct current, alternating current, exploring generation

What is static electricity?	http://www.ducksters.com/science/static_electricity.php
	http://www.explainthatstuff.com/electricity.html
Activities to learn about static electricity	https://www.youtube.com/watch?v=-w-GoSJpvdw
	https://www.youtube.com/watch?v=fT_LmwnmVNM

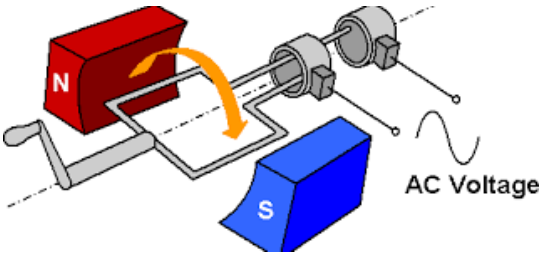
2 b. What is direct current?



Safety First	
AC vs DC Power?	https://www.youtube.com/watch?v=g17f9J1-r-k
Build an Electric Motor	https://www.youtube.com/watch?v=elFUJNodXps
	https://www.youtube.com/watch?v=a5nGCgk8nsA

2 c. What is alternating current?

Start with static, move to direct current, alternating current, exploring generation



What is static electricity?	http://www.ducksters.com/science/static_electricity.php
	http://www.explainthatstuff.com/electricity.html
Activities to learn about static electricity	https://www.youtube.com/watch?v=-w-GoSJpvdw
	https://www.youtube.com/watch?v=fT_LmwnmVNM
What is alternating current?	http://www.physics4kids.com/files/elec_ac.html
Activities to learn about alternating current	https://www.youtube.com/watch?v=-w-GoSJpvdw
	https://www.youtube.com/watch?v=fT_LmwnmVNM

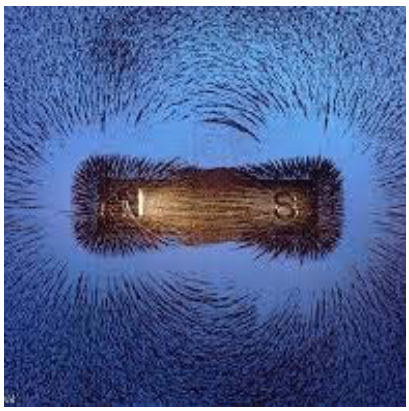
2 d. Exploring electrical generation

How do we generate electricity?	https://www10.bchydro.com/about/resources (A district account in which this information is accessed, may be possible.)
	https://www.youtube.com/watch?v=vko0KrE5O1k
	http://www.childrensuniversity.manchester.ac.uk/interactives/science/energy/electricity/
	https://www.youtube.com/watch?v=PvJHjnELVSM

2 e. Puntledge River field trip

Think local … Place-Based Learning	Take your class to Comox Lake and walk down the pipes to our local power station. On another day tour the power station then travel from there along the Puntledge River. This allows students to better understand the need for slope, the need to conserve our waterways, and that Comox Lake is behind a human-made dam and is subject to tectonic forces (earthquakes).

3. What is electromagnetism?

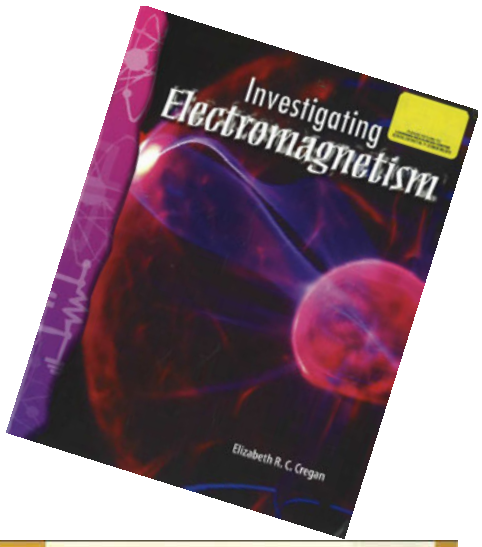


Electromagnetism Cartoon	https://www.youtube.com/watch?v=_ygmHnjNYNo
How to make an Electromagnetism : … Student Created	https://www.youtube.com/watch?v=iSuSWi7YThA https://www.youtube.com/watch?v=PwVuLK0Q-po
Magnets and Electromagnet Uses: Theme Parks, Credit Cards, Junk Yards, and our Earth!	https://www.youtube.com/watch?v=BY1LS10GMkg (This one is 45 minutes long.)

The things you discover at a party!

Electromagnetism? Who, What, and When?

In 1820, a scientist named Hans Oersted was at a party. He placed a compass near an electrical current and noticed that the needle on the compass moved. The electrical current had made a magnetic field.



The first known magnets were natural ones, like lodestone. Scientists began to wonder if they could make artificial (ar-tuh-FISH-uhl) magnets, too. Artificial means something that is man-made.

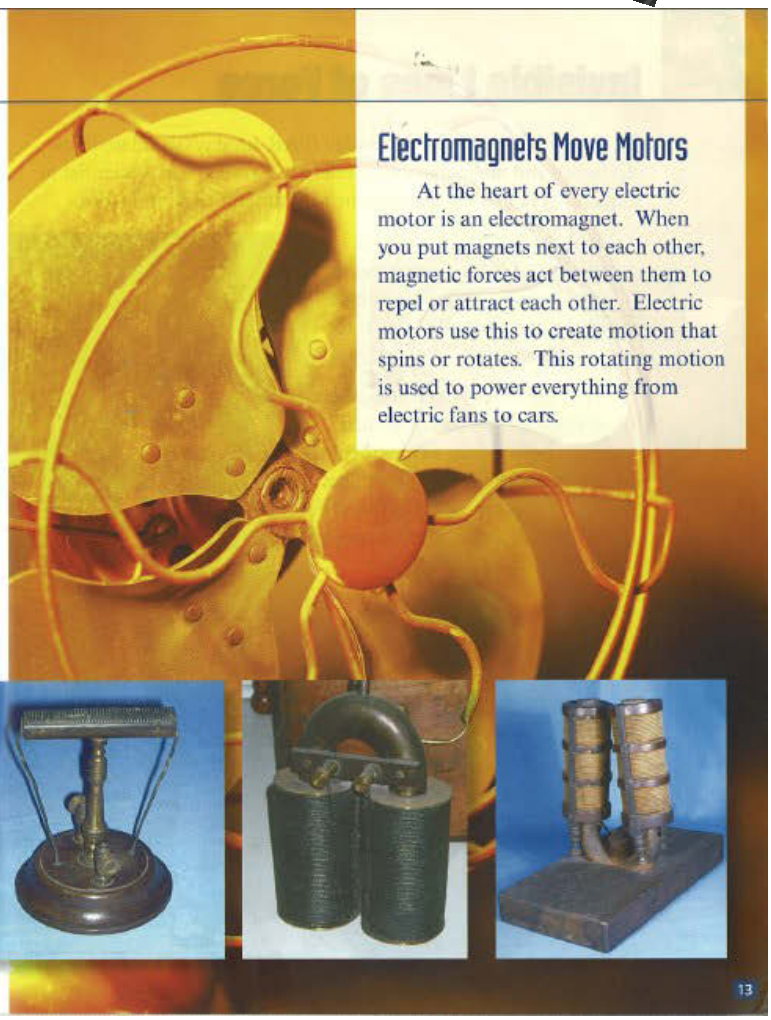
In 1820, one scientist found a way. At a party, Hans Oersted placed a compass near an electrical current. He noticed that the needle on the compass moved. The electrical current had made a magnetic field. Oersted investigated further. He found that electrical currents have magnetic fields that go around the wire.

This showed that there is a close relationship between electricity and magnetism. And that led to the discovery of the electromagnet. An electromagnet is a device that is found in everything from telephones to the motors in washing machines.

A simple electromagnet is a coil of wire attached to the negative and positive ends of a **battery**. Electrons flow from the negative end of the battery through the wire. They arrive at the positive end of the battery. This flow of electricity creates a small magnetic field around the wire.

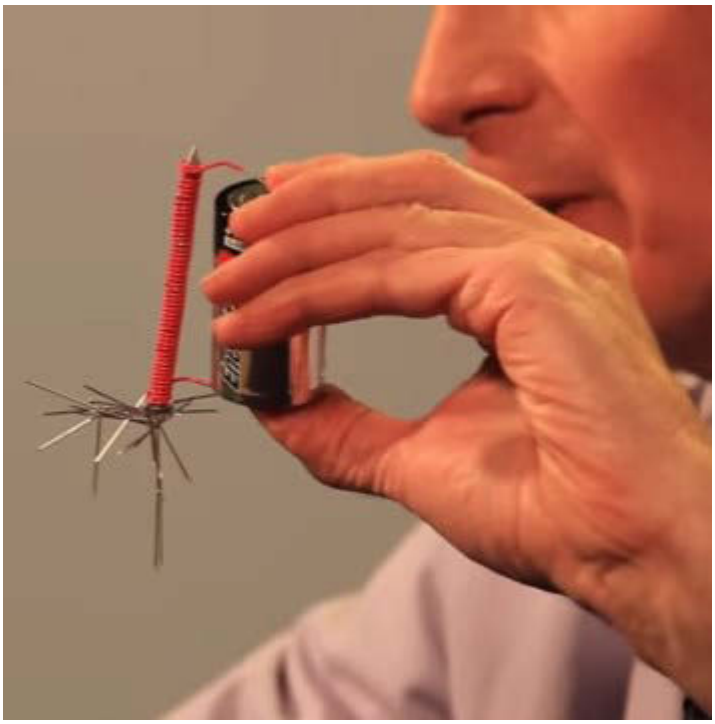
An electromagnet can be made stronger by using more turns or wires in the coil or more current in the circuit. A piece of soft iron like a nail put through the coil makes the electromagnet stronger still.

Electromagnets can be created in many different ways. Notice that each of these contains a coil of wire attached to the negative and positive ends of a battery.



Electromagnets Move Motors

At the heart of every electric motor is an electromagnet. When you put magnets next to each other, magnetic forces act between them to repel or attract each other. Electric motors use this to create motion that spins or rotates. This rotating motion is used to power everything from electric fans to cars.



Bill Nye

the Science Guy

With a Google search, you will find the Bill Nye clip about electromagnetism.

https://www.youtube.com/watch?v=sFC7-WVNUP8

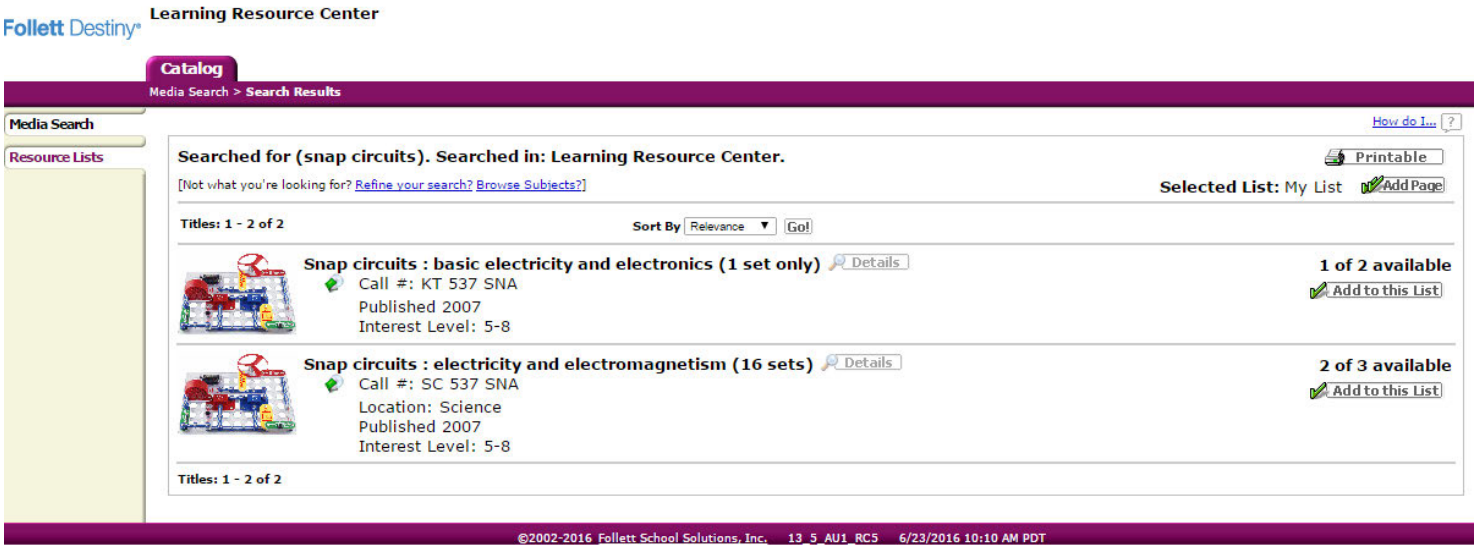
And the full episode on magnetism is also available.

https://vimeo.com/121217374

Using the Electromagnetism materials within this kit, **invite students to experiment and create a snap circuit.**

4. How do we use electricity?

(In school district #71 these snap circuit kits may be ordered through Destiny.)



SCIENCE WORLD at TELUS WORLD of SCIENCE

https://www.scienceworld.ca/resources/activities/burglar-alarm

Burglar Alarm

Make & Take

Go Back Print

ACTIVITY LENGTH:
30 mins.

RESOURCE TOPIC:
Electricity

INTRODUCTION

Have you ever wondered how a burglar alarm works? Its science revolves around complete and incomplete electric circuits. In this activity students will make a burglar alarm that they can use to protect something precious to them.

In this burglar alarm, a piece of cardboard prevents completion of the circuit by preventing the foil-lined tips of the clothespin from touching. Thus, when the alarm is set, the light is off. If someone steals the protected item, the thread and the attached cardboard are pulled away. This permits the foil-lined tips of the clothespin to touch, completing the circuit and allowing the electrons to flow. The light turns on, to warn you that the item was stolen.

A real burglar alarm is triggered when the intruder breaks a light or laser beam, which is invisible to the human eye, but needed to complete a circuit. When the beam is broken, the electronic system detects the change in the circuit, and sounds the alarm.

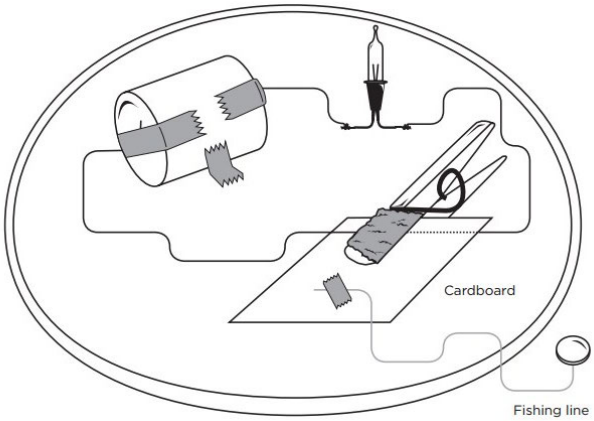
WHAT TO DO

Preparation:

1. Put together a kit of supplies in a baggie for each student.

Instructions:

1. Tape the battery to the plate.
2. Wrap aluminum foil around each leg of the clothespin.



SCIENCE WORLD at TELUS WORLD of SCIENCE

https://www.scienceworld.ca/resources/units/current-electricity

Current Electricity

Go Back Print

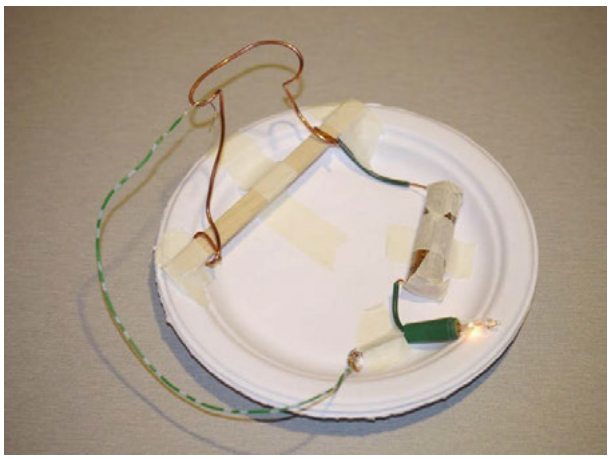
LEVEL:
Grade 7 Grade 9

INTRODUCTION

Electric current is the flow of electrons through a complete circuit of conductors. It is used to power everything from our lights to our trains. In these activities, students will explore different kinds of circuits and investigate what is required to make a complete circuit.

LIST OF ACTIVITIES

Electrons on the Go
Conducting Currents
Lemon Battery
Lighting Light Bulbs
Conductivity Tester
Steady Hand Game

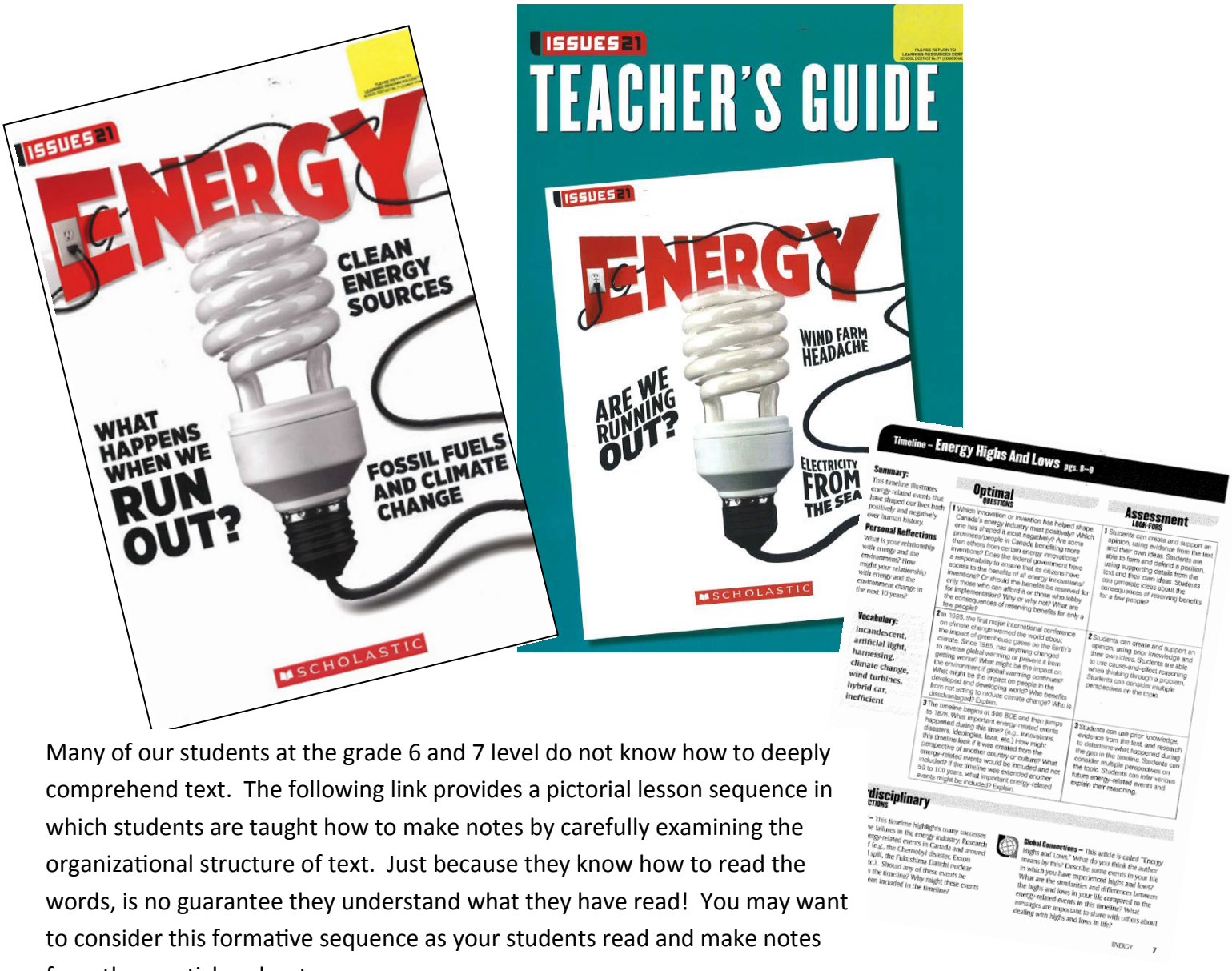


OBJECTIVES:

- Describe the components required to complete an electric circuit.
- Demonstrate the different ways to complete a circuit (parallel or series).
- Identify how electricity is used in household appliances.
- Describe the relationship between an electron and current electricity.

5. Life without Electricity

The 'Energy' issue from Scholastic's Issues 21 series provides several articles about energy sources, impacts on the environment and examines non-renewable energy resources that are running out. These articles fit nicely within this unit and offer a means to an interdisciplinary approach to science through language arts.



Many of our students at the grade 6 and 7 level do not know how to deeply comprehend text. The following link provides a pictorial lesson sequence in which students are taught how to make notes by carefully examining the organizational structure of text. Just because they know how to read the words, is no guarantee they understand what they have read! You may want to consider this formative sequence as your students read and make notes from these articles about energy.

http://www5.sd71.bc.ca/literacy/wp-content/uploads/2011/11/A-Note-Making-Lesson-Sequence.pdf

When the WIND BLOWs

START UP What are some of the environmental impacts of wind energy?

WIND ENERGY IS A RENEWABLE RESOURCE THAT CAN GENERATE ELECTRICITY WITHOUT POLLUTING THE ENVIRONMENT. It also requires no fuel to produce electricity. But it has some drawbacks, too. Read on to find out if wind energy is a possible solution to the energy crisis.

Protesting against industrial wind turbines in Toronto, 2013

Humans have been harnessing the power of the wind for centuries. Before we had electricity, windmills were used to pump water, grind grain for bread, and saw lumber.

Canada started using wind turbines in the 1970s, and now every province uses wind power to varying levels. More than two million homes and businesses are powered by wind-generated electricity. Ontario, Quebec, and Alberta are the top three producers. Wind energy production grew by about 20 percent in 2012, creating 10 500 jobs. Although wind energy provides only three percent of Canada's energy needs, it is an important part of a balanced energy supply. The Canadian Wind Energy Association believes that wind energy will provide 20 percent of our electrical power by 2025.

The Benefits of Wind Power

Wind turbines have relatively low running costs and last for a long time. The initial cost of building them is expensive, but once they are installed, a large wind turbine can generate enough electricity for up to 500 homes.

A wind farm is a group of large wind turbines. Grouping them saves money and generates a lot more electricity.

The Drawbacks of Wind Power

There are several drawbacks to wind power. To start with, the amount of electricity generated from a wind turbine depends on the wind speed. Some people also find wind turbines to be noisy and ugly. And finally, wind farms require a lot of space and land.

Health Concerns

Not everyone is in favour of this type of renewable energy. Some people believe there are health effects for people living near wind turbines. The main concern is that the low sound from wind turbines may cause headaches, sleep disturbances, anxiety, and depression.

In 2010, a report from the Ontario Chief Medical Officer of Health concluded that low frequency sound levels between 50 and 70 decibels (dB) can cause negative health effects. Wind turbines, however, are quieter than that. Ontario requires that wind turbines be quieter than 40 dB at the nearest residence. This is equivalent to indoor background sound.

Even so, nose and throat specialists in the United Kingdom found that inaudible sound waves produced by wind turbines may have physiological effects, but without hard evidence it is difficult to say for sure. To address this issue, Health Canada is conducting a $1.8-million study on the residents of 2000 homes near wind farms.

Other Issues

Wind turbines may also cause problems not related to sound. The shadows on land and houses caused by the spinning blades cause a shadow flicker where the light appears to flick on and off. Three percent of people diagnosed with epilepsy are sensitive to flicker frequencies between five and 30 hertz. However, most industrial wind turbines rotate at a slower rate.

The presence of snow and ice on wind turbines may also be dangerous. Ice that forms on the blades can be thrown or break loose. Some large ice chunks have been found up to 100 metres away from wind turbines.

If you were a bird or a bat, you would have a definite right to dislike wind power. One study of 86 turbines on Wolfe Island in Ontario found that 602 birds and 1270 bats were killed between July and December of 2009. The number of animals killed will depend on the location and type of turbine, but the numbers can add up quickly.

Is wind power really a problem?

Even with all of the reports of negative health effects and a Health Canada study in the works, many people do not believe that there are health issues related to wind turbines.

An Australian study found that the health effects are in the heads of those with complaints. The study reported that health complaints started only after the anti-wind awareness campaigns began. This means that people began to feel the health effects only after they had heard about them in the news.

Clearly, as we try to solve the energy crisis, the future of wind power is up for debate. While there are many benefits to wind energy, there are also significant problems to consider.

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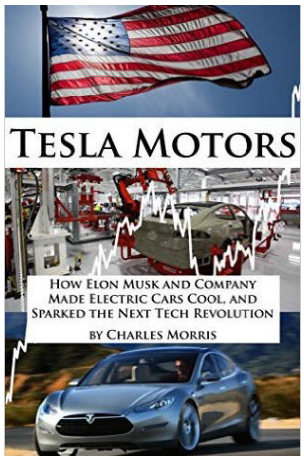
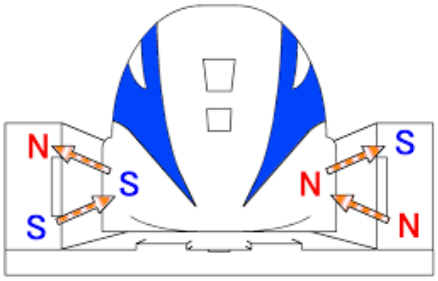
inaudible: *not able to be heard*
physiological: *related to how the body functions*
epilepsy: *brain condition that may cause seizures*

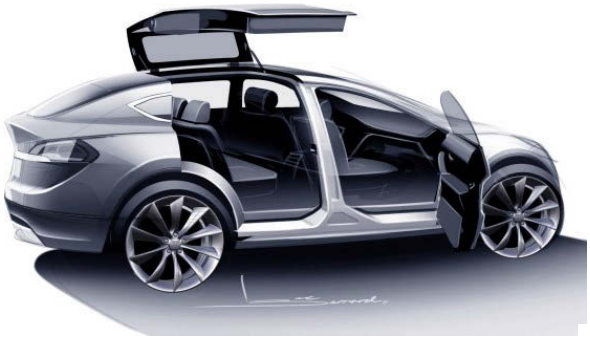
DIVE DEEPER Would you support a wind farm being built near your home or school? Why or why not?

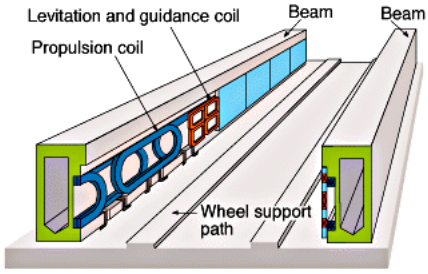
6. Taking the next steps through inquiry projects

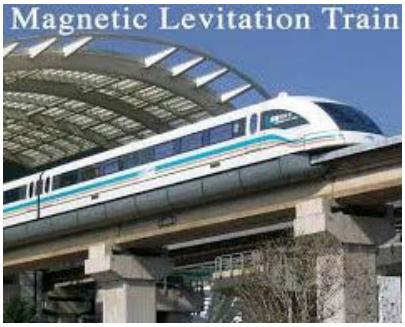
Mini-Inquiry: near-term futures provide an opportunity for students to investigate some of the newest developments in physics technology … electric cars and storage batteries (Elon Musk), magnetic levitation trains, driverless vehicles.

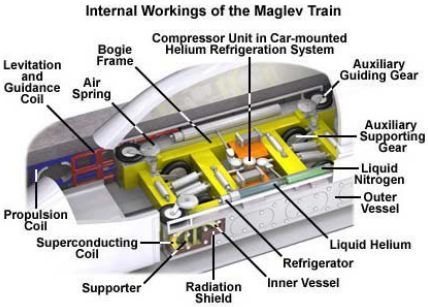


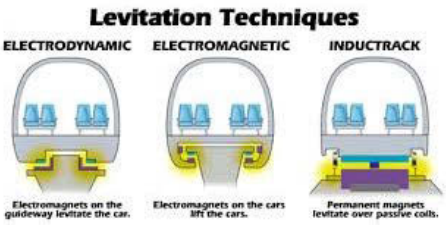










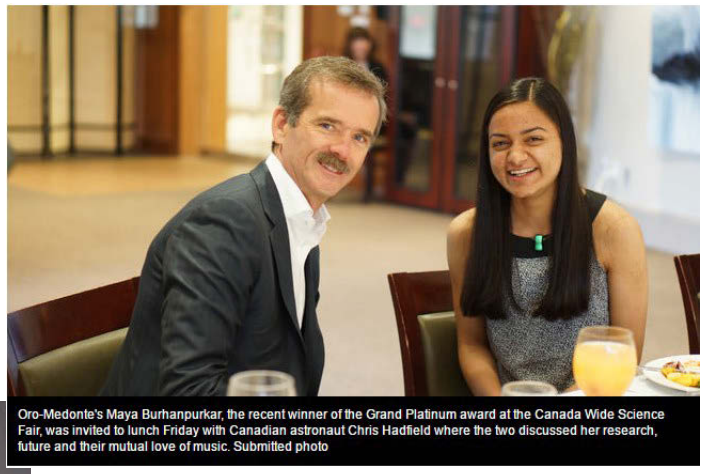


7. Canadian role models

These super young scientists are doing amazing things! Share a couple of these examples with your students, then have them do a mini-inquiry to inspire the science within their souls! *Who are the young scientist shaking up the world?*

Youth Innovator Ann Makosinski Wins 2

Top20Under20, 2014 - Raymond Wang



Oro-Medonte's Maya Burhanpurkar, the recent winner of the Grand Platinum award at the Canada Wide Science Fair, was invited to lunch Friday with Canadian astronaut Chris Hadfield where the two discussed her research, future and their mutual love of music. Submitted photo

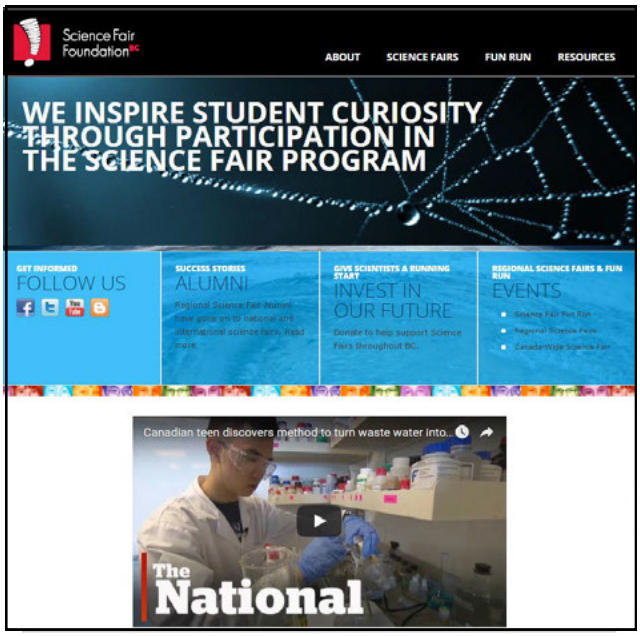
Oro-Medonte teen wins Canada-Wide science award, lunch with an astronaut

Raymond Wang, Nicole Ticea Win Top Intel Science Fair Awards

What characteristics or scientific processes do these award winning students have or share?

Who else has been shaking up the world of science at a very young age? And what have they been discovering?

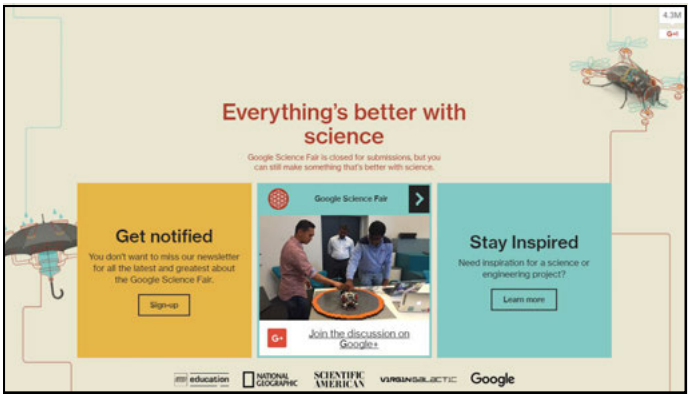
Science Fairs



http://www.sciencefairs.ca/

http://cwsf.youthscience.ca/

http://cwsf.youthscience.ca/



S.D. #71 Comox Valley, British Columbia, Canada http://www.sciencebuddies.org/science-fair-projects/scifair.shtml

Source:

New Curriculum Organized with elaborations — by Janet Chow of Burnaby

http://blogs.sd41.bc.ca/learningtech/new-curriculum/

BIG IDEA (Understand…)	What do we want students to DO? (Activities, lessons…)	Content (& Elaborations) (Know)
The electromagnetic force produces both electricity and magnetism	*Questions to support inquiry with students:* How is electricity generated? What is the relationship between electricity and magnetism?)	**Core Focus: PHYSICS** • electricity — **generated in different ways** (*ways of generating electricity including the use of wind, water, coal, geothermal, and solar energy.*) with different environmental impacts • electricity — used to **generate magnetism** (*the force of electromagnetism causes both electricity and magnetism; magnets are used to generate electricity, and electricity can be used to generate magnets; students can construct a simple electromagnet using a wire and battery or create a current by moving a magnet in a coil of wire*)

Assessment Framework

Subject: Science **Grade: 7**

Strand: Physics

Unit		
Physics	Magnetic Fields	I can describe and demonstrate magnetic poles either attract or repel magnetic materials.
		I can discriminate between four basic types of magnets (permanent, temporary, electromagnets and superconductors).
		I can define the Curie temperature and the impact heat has on ferromagnetic materials.
		I can distinguish between ferromagnetic, paramagnetic, and diamagnetic materials.
		I can name a variety of ways in which magnets are used in our world.
	Magnetic Forces	I can describe the connection between the magnetosphere and the norther lights.
		I can sketch a map of Earth's magnetic field.
	Electricity	I can give examples of different ways in which electricity can be generated.
		I can critique the environmental impacts associated with the ways in which electricity is generated.
		I can build a simple electrical circuit.
	Electromagnetism	I can create a simple electromagnet.
		I can create snap circuits to demonstrate my understanding of electromagnetism.
		I can describe through pictures and labels, my understanding of the Earth's magnetic field.
		I can construct a simple electromagnet using a wire and battery.
		I can create a current by moving a magnet in a coil of wire.
		I can explain the connection between electromagnets and Vancouver's Skytrain.

Today's Learning
for Tomorrow's World

School District 71 (Comox Valley)
www.sd71.bc.ca

An electronic copy of this teacher guide can be found on Learn71 at
https://portal.sd71.bc.ca/group/wyhzgr4/Pages/default.aspx

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